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**NAVAL
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MONTEREY, CALIFORNIA

THESIS

**ADAPTING THE VEHICLE MOUNTED TACTICAL
LOUDSPEAKER SYSTEM TO TODAY'S OPERATIONAL
ENVIRONMENT**

by

Jonathan B. Keiser
Mark C. Engen

December 2006

Thesis Advisor:
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Anna Simons
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**ADAPTING THE VEHICLE MOUNTED TACTICAL LOUDSPEAKER SYSTEM TO
TODAY'S OPERATIONAL ENVIRONMENT**

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ABSTRACT

From the time they were first used by the United States Army during World War II, loudspeakers have proven to be an effective means for tactical psychological operations (PSYOP) teams to disseminate messages to their intended target audiences. The vehicle mounted family of loudspeakers (FOL) is the loudspeaker system currently being utilized by tactical psychological operations forces as the primary mobile means of disseminating messages or sound effects to their target audiences. In its current configuration, the vehicle mounted loudspeaker system is not meeting the needs of the tactical PSYOP teams (TPTs) conducting operations in today's operational environment. The objective of our project is to determine why the current loudspeaker system is not meeting the requirements of the TPTs, and provide recommended changes to the current FOL system.

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I. INTRODUCTION

A. INTRODUCTION

From the time they were first used by the military during World War II, loudspeakers have proven to be an effective means for tactical psychological operations (PSYOP) teams to disseminate messages to their intended target audiences. Loudspeakers have been primarily used to broadcast such things as surrender appeals to enemy combatants, informational messages to civilians, and sound effects during deception operations. During combat operations, loudspeakers have been shown to be more advantageous than other means of dissemination, such as leaflets and radio, because loudspeakers provide tactical PSYOP teams (TPT) the flexibility to rapidly adjust their messages given fast-changing tactical battlefield situations.¹ Enemy commanders can prohibit their soldiers from picking up leaflets and listening to the radio, but they can't prevent their soldiers from hearing loudspeaker broadcasts. Additionally, loudspeaker broadcasts do not require the target audience to take any action or require listeners to have any special equipment, such as a radio, a television, or the internet, to receive the message.²

B. BACKGROUND

The vehicle mounted family of loudspeakers (FOL) is the loudspeaker system currently utilized by tactical psychological operations forces as the primary mobile means

¹ Stanley Sandler and U.S. Special Operations Command. Directorate of History and Museums, *Cease Resistance: It's Good for You: A History of U.S. Army Combat Psychological Operations* (Washington, D.C.: United States Army Special Operations Command. Directorate of History and Museums, 1999), 102.

² Ibid., 225.

of disseminating messages or sound effects to the selected target audience. The system consists of a speaker cone assembly, a power amplifier, and a control box. The speaker cone assembly was designed to provide tactical PSYOP teams (TPT) the capability of disseminating focused, unidirectional loudspeaker broadcasts to their intended target audience. The focus of this thesis is the speaker cone assembly.

The current speaker cone assembly is made up of six speaker cones mounted in a three wide by two high configuration. The assembly is designed primarily to be mounted on the gunner's turret on top of the high mobility military wheeled vehicle (HMMWV). In its current configuration, the speaker cone assembly is too heavy and too bulky. The weight prohibits the turret gunner from quickly traversing the turret and is causing the turret to unintentionally traverse during sudden braking or acceleration of the vehicle. The placement and large size of the speaker cone assembly obstructs the turret gunner's vision which decreases his ability to accomplish his primary responsibility of providing security for the TPT to which he is assigned.

As a result of the weight and obtrusiveness of the loudspeaker system, many TPTs are opting to remove the loudspeaker assembly and power amplifier from their HMMWV during missions for which broadcast missions are not planned. This is a problem because the loudspeaker is a primary weapon system for the TPT. The loudspeaker system should remain mounted on the HMMWV during missions as the team may find itself in a situation where it needs to communicate to its target audience.

C. PROJECT OBJECTIVES

The objective of our project is to determine whether the current loudspeaker system is meeting the requirements of the TPTs and, if not, provide recommended changes to the current FOL system. Through evaluation of the current vehicle mounted FOL, we will determine where a change in its configuration would provide tactical PSYOP teams a better system for disseminating psychological operations messages while conducting operations in the current operational environment.

D. METHODOLOGY

The information presented in this thesis was attained through a literature review, the personal combat experiences of the authors, and the combat experiences of others within the PSYOP community. By capturing historical and current capabilities, we will determine the required capabilities of the vehicle mounted tactical loudspeaker system. Our aims are to:

(1) Explore the different methods PSYOP forces use to disseminate their messages to better understand the role of loudspeakers in the dissemination of PSYOP messages.

(2) Develop a complete understanding of the needs of the tactical psychological team in relation to its ability to conduct loudspeaker broadcasts in today's operational environment.

(3) Determine if and how the vehicle mounted tactical loudspeaker system's design should be changed as the next generation of loudspeaker systems is developed in order to meet the requirements determined from our applied research.

E. ORGANIZATION OF THE STUDY

This study will be organized into the following chapters. We will introduce the topic in the first chapter. In Chapter II we will define psychological operations and provide a description of the current methods of disseminating PSYOP messages to reinforce the significance of loudspeaker operations. In Chapter III we will provide a description of planning and operational considerations for the employment of tactical loudspeakers during combat operations. We will offer a historical, in-depth look at PSYOP loudspeaker operations and examine how loudspeakers evolved to meet the requirements of the PSYOP forces employing them. Finally, we will define the current operating environment and how loudspeakers are being employed in this environment. We will then go on in Chapter IV to describe the current PSYOP family of loudspeaker systems as well as the current vehicle mounted tactical loudspeaker system in particular. Given user feedback from tactical PSYOP teams that have employed the vehicle loudspeaker system during Operations ENDURING FREEDOM (OEF) and IRAQI FREEDOM (OIF), we will turn in Chapter V to the shortfalls in the current system and provide recommendations for the development of the next generation of the vehicle mounted loudspeaker.

F. CONCLUSION

The PSYOP loudspeaker has remained largely unchanged since its introduction in World War II. Its focused, unidirectional design has primarily been influenced by the type of Cold War, conventional, force on force warfare that only required a unidirectional capability. Recent lessons being drawn from Operations Enduring Freedom and Iraqi Freedom have identified the current vehicle mounted

tactical loudspeaker system's speaker cone assembly as being too obstructive and cumbersome. Its size along with its unidirectional design does not seem to be meeting the needs of the tactical PSYOP teams in their current, unconventional operational environment. Lessons from past and present conflicts suggest ways we can improve on loudspeakers and their design in order to better meet the needs of the PSYOP forces that rely on them.

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II. PSYCHOLOGICAL OPERATIONS

A. INTRODUCTION

Joint Publication (JP) 3-53, Doctrine for Joint Psychological Operations, defines psychological operations (PSYOP) as "planned operations to convey selected information and indicators to foreign audiences to influence the emotions, motives, objective reasoning, and ultimately the behavior of foreign governments, organizations, groups, and individuals."³ The purpose of psychological operations is "to induce or reinforce foreign attitudes and behavior favorable to the originator's objectives."⁴

To accomplish these tasks, PSYOP forces use a variety of equipment and platforms to plan, develop, produce, distribute, and disseminate their selected information to their foreign target audiences. In the effort to remain relevant, the equipment and platform must be kept up to date with current technology. However, it is important to understand that information-age technologies do not change the definition or purpose of PSYOP. Rather they should be used to enhance and improve the ability of PSYOP personnel to provide support to theater combatant commanders, joint task force commanders, and tactical-level commanders.⁵

³ United States Joint Chiefs of Staff, *Doctrine for Joint Psychological Operations* (Washington, D.C: Joint Chiefs of Staff, 2003), ix.

⁴ Ibid.

⁵ United States Army John F. Kennedy Special Warfare Center and School, *Psychological Operations Handbook: Equipment Types, Specifications, and Capabilities* (Fort Bragg, NC: Headquarters, United States Army John F. Kennedy Special Warfare Center and School, 2005), 1.

There are several different techniques PSYOP forces use to disseminate their selected information: face-to-face (interpersonal), leaflet, audiovisual, and audio. To fully understand the relevant role of loudspeakers in the dissemination of PSYOP messages during combat operations, it's necessary to be familiar with the different methods of dissemination PSYOP forces employ.

B. PSYOP DISSEMINATION METHODS

1. Face-to-Face (Interpersonal) Communication

Face-to-face communication (Figure 1) is arguably the most effective means of transmitting a persuasive message. It involves the conveyance of a message by the sender or group of senders within the sight or presence of the receiver or a group of receivers. PSYOP forces may choose to use handbills, leaflets, posters, or novelty items (such as soccer balls or book bags) with their message printed on them for face-to-face communication and dissemination. The U.S. Army Field Manual (FM) 3-05.301, Psychological Operations Tactics, Techniques, and Procedures, lists several advantages and disadvantages of using face-to-face communication.



Figure 1. Face-to-face communication. (From: USASOC News Service)

a. Advantages of Face-to-Face Communication⁶

(1) Relationship. Face-to-face communication enables an interpersonal relationship between the disseminator and the target audience. This relationship can have a substantial effect in how the target audience perceives the message.

(2) Audience Selection. Face-to-face enables the PSYOP team to deliberately select the target audience and the message can be tailored and directed for that specific audience.

(3) Assessment of Impact. Employing face-to-face communication provides the PSYOP team immediate feedback. The communicator can immediately assess the initial impact of his message and adjust his approach to obtain the desired response from the target audience.

⁶ United States Department of the Army, *Psychological Operations Tactics, Techniques, and Procedures* (Washington, DC: Headquarters, Dept. of the Army, 2003), 10-7.

(4) Requirement for Limited Support.

Because face-to-face communication does not require any special equipment, there is little technical and logistical support required.

(5) Credibility. Face-to-face

communication can be more credible than other methods because the target audience can see and immediately begin to evaluate the source of the message.

(6) Presentation. Face-to-face allows for complex material to be presented in detail. Frequent repetition and slight variations can be readily adopted by the PSYOP team to influence its target audience.

(7) Expediitiousness. In some instances, particularly in primitive areas, face-to-face communication may be the most expeditious method of dissemination.

b. Disadvantages of Face-to-Face Communication⁷

(1) Limited Use in Tactical Situations.

The employment of face-to-face communication can be limited during combat operations because the accessibility of the target audience may be limited due to the lack of security. Often, the PSYOP team will not have the opportunity for face-to-face communication with the adversary until members of the enemy are captured.

(2) Close Control Necessary. Face-to-face dissemination must be controlled, especially at the lowest levels where each communicator has the responsibility to interpret policy and objectives. This is best illustrated by trying to pass an oral message, one person at a time,

⁷ United States Department of the Army, *Psychological Operations Tactics, Techniques, and Procedures* (Washington, DC: Headquarters, Dept. of the Army, 2003), 10-8.

throughout a group. By the time the message reaches the end of the group, it often does not resemble the original message. Reinforcement of the message by other media is necessary to alleviate this problem.

(3) Limited Use in Secure Areas. Security considerations limit the conduct of face-to-face communications. As security improves, area coverage by PSYOP teams can be extended.

(4) Able Communicators Required. Effective communication requires knowledgeable, vocally persuasive individuals who can convince the target audience that the program and policies are irresistible and inevitable.

(5) Indigenous Personnel Required. For effective communications, indigenous personnel are normally employed as interpreters to help overcome language and cultural barriers.

(6) Limited Range of Voice. The range of a human voice and the need for visual contact limit this method to relatively small audiences.

2. Leaflet Dissemination

Leaflet dissemination is most effectively used when the PSYOP force requires a mass dispersal of its message to areas that are difficult to reach. Aerial leaflet dissemination is often used as an alternative, or reinforcing technique, to face-to-face communication when the political, security, or environmental situation prohibits PSYOP forces from entering the region of their target audience. Leaflet dissemination operations require intensive planning and preparation and are highly dependent on weather in the target area. Unlike face-to-face

communication or loudspeaker broadcasts, leaflet dissemination doesn't provide PSYOP force immediate target audience feedback. FM 3-05.301 lists the following methods for air-to-ground delivery of leaflets:⁸

(1) Airdrop by Hand. The airdrop by hand technique (Figure 2) involves dropping leaflets by hand through rotary or fixed wing aircraft doors in areas where low altitude delivery is feasible. Utilizing this efficient, inexpensive technique, two soldiers can dispense thousands of leaflets per minute.



Figure 2. Airdrop by hand. (From: Psywarrior)

(2) High-Altitude Free Fall. This technique involves dispensing leaflets from aircraft flying at altitudes of up to 50,000 feet. High-altitude free fall drops are only used when the drops are directed at large general target areas. They require long-range planning and preparation to ensure prompt reaction to favorable wind conditions.

⁸ United States Department of the Army, *Psychological Operations Tactics, Techniques, and Procedures* (Washington, DC: Headquarters, Dept. of the Army, 2003), 10-10.

(3) Static-Line Technique. The static-line technique (Figure 3) of leaflet delivery has proven effective and involves dropping leaflet bundles or boxes that are opened by static line from aircraft flying at high altitudes. Essentially, the box is turned inside-out by the static-line causing the leaflets to disperse and fall away.



Figure 3. Leaflets rigged for static line delivery.
(From: Psywarrior)

(4) Leaflet Bomb. A leaflet bomb (Figure 4) is essentially a bomb shell that is filled with machine-rolled leaflets. Before the leaflets are placed in the bomb, a detonating cord is placed in the seam between the two halves that, once the fuse functions, causes the bomb shell to separate and disperse the leaflets after the bomb is released from the aircraft.



Figure 4. PDU-5/B leaflet bomb with leaflet rolls.
(From: Psywarrior)

3. Audiovisual Media (Television)

The dissemination of PSYOP messages involving audiovisual media is dominated by television. By appealing to two of the human senses, television's effectiveness is based on seeing and hearing the persuasive message which makes it an excellent means of transmitting persuasive messages and eliciting a high degree of recall in the target audience.

a. Advantages of Television⁹

(1) Speed. Although the themes will often remain the same, the actual PSYOP messages often change based upon feedback from the target audience. Television provides an excellent platform for rapid dissemination to a large audience. Unless the broadcast is live, the only limitation to broadcasting the message is the rate at which the PSYOP product can get to a broadcasting platform.

⁹ United States Department of the Army, *Psychological Operations Tactics, Techniques, and Procedures* (Washington, DC: Headquarters, Dept. of the Army, 2003), 10-17.

(2) Audience Illiteracy. Unlike printed media, illiteracy is not a barrier for television which enables the message to reach a larger audience.

(3) Unification. By exposing widely dispersed and disconnected audiences visually to the same ideas and concepts, television has a unifying effect as it brings people from widely separated locations closer together.

(4) Aural-Visual Effect. Television targets and appeals to both the aural and visual senses. By appealing to these two senses television provides the viewer with a sense of involvement which can be exploited by a good PSYOP message.

b. Disadvantages of Television¹⁰

(1) Range. The strength and range of a television signal is dependant on favorable geography and atmospheric conditions. Mountainous regions, such as those found in Afghanistan, create limitations for ground based television broadcasting when trying to reach a large target audience. However, as satellite receivers become cheaper and more popular around the world, range will become less of an issue.

(2) Reception. The ability to receive a television message differs around the world. In many developing countries, only wealthy citizens own televisions. Therefore, the wealthy may be the only ones who will directly receive the message. This must be taken into account when developing the PSYOP program as the intended target audience may not be the wealthy.

¹⁰ United States Department of the Army, *Psychological Operations Tactics, Techniques, and Procedures* (Washington, DC: Headquarters, Dept. of the Army, 2003), 10-17 - 10-18.

(3) Power. Television receivers require electricity. If the target audience lives in an area lacking electricity, television would not be an effective means for reaching the target audience.

(4) Vulnerability. Television receivers and the equipment required for television broadcasts are fragile and extremely vulnerable to physical damage as well as damage caused by austere environmental conditions. The antennae or satellite dishes that are required to broadcast and receive television signals are easily identified and difficult to hide. As a result, they make excellent targets for destruction by those who do not want the target audience to receive the televised message. For example, to prohibit Iraqis from watching unregulated television, Iraqi President Saddam Hussein outlawed satellite dishes making it difficult for PSYOP forces to utilize television to reach their target audience within Iraq.

(5) Program Requirements. Producing a daily television program requires a substantial production staff as well as supportive equipment. Although the utilization of host nation media assets or reach-back may help to minimize production limitations, this is only feasible when the host nation media is cooperative and supportive of the PSYOP force's programming mission.

(6) Maintenance. The maintenance of television broadcasting equipment is highly technical and requires highly trained and skilled technicians and engineers. In most developing countries, such skilled people are difficult to find. Therefore, the PSYOP force must deploy with additional personnel who are capable of supporting the maintenance requirements.

(7) Audience Accessibility. The accessibility to the target audience may be especially difficult in hostile areas. Incompatibility between broadcasters and receivers, conflicts with other electronic equipment utilizing the same frequency, enemy jamming, and censorship limit the use of television in hostile areas.

4. Audio Media

Audio media, such as radio and loudspeaker broadcasts, provides PSYOP forces the ability to transmit brief, simple messages that require little or no effort by the audience. Unlike printed media, audio media is ideal for communicating with an illiterate but not unsophisticated target audience.

a. Radio Broadcasting

Radio broadcasts provide PSYOP forces the capability to reach local and worldwide target audiences quickly and simultaneously. Radio messages can be quickly tailored based on changing situations and feedback received from the target audience. Essentially, radio broadcasts enable PSYOP forces to capitalize on opportunities presented that affect the target audience. Whenever possible, it is important to use host nation broadcast equipment because local radio stations and frequencies will help decrease costs and increase the legitimacy of PSYOP messages. During peace time operations, PSYOP forces often purchase airtime to broadcast their messages from local stations. During combat operations, PSYOP forces often use captured or abandoned radio stations to get their messages out. Therefore, it is important to ensure that the supported maneuver commander limits or prevents damage to host nation radio stations in his area of operations.

Radio broadcasting enjoys several advantages over television broadcasting. Unlike television programming, radio programming is relatively inexpensive to produce and does not require as substantial a production staff. Audio programs are also easily translated into different languages depending on the target audience. Because audio files are relatively small, they can be recorded at a home station and transmitted electronically to forward deployed PSYOP units via reach back assets. Additionally, radio receivers can be disseminated to the populace to facilitate the target audience's ability to receive PSYOP radio programming.

PSYOP units possess a small inventory of deployable dissemination systems capable of broadcasting across the frequency spectrum - AM, FM and SW. Broadcast ranges of the systems vary but are somewhat limited compared to commercial radio stations. Despite their limitations, these systems have proven to be crucial in disseminating PSYOP messages when commercial radio stations are unavailable or are unwilling to broadcast PSYOP content. The 193rd Special Operations Wing of the Pennsylvania Air National Guard possess several modified C-130 aircraft (EC-130E/J, COMMANDO SOLO) with the capability of broadcasting across the entire radio and television spectrum. The significance of this dissemination platform is its ability to broadcast into denied areas from the safety of high altitude orbit.

b. *Loudspeaker Operations*

Loudspeaker operations are the primary means for tactical PSYOP forces to disseminate their messages to the intended target audience. Loudspeaker operations

essentially extend the range of face-to-face communications. As the focus of this thesis project, loudspeaker operations will be covered extensively in the next chapter.

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III. LOUDSPEAKER OPERATIONS

A. INTRODUCTION

Since they were first used by the military in World War I, loudspeakers have proven to be an effective means for tactical Psychological Operations (PSYOP) teams to disseminate messages to their intended target audiences. Loudspeakers have been primarily used to broadcast such things as surrender appeals to enemy combatants, instructional messages to enemy forces in fortified positions and locations, and sound effects of vehicles or other equipment during deception operations. Loudspeakers can also be used instructionally to help control the flow of refugees and to issue non-interference instructions to civilians on the battlefield.¹¹

Of the many types of media PSYOP forces use to communicate their messages, the loudspeaker is the most effective for tactical PSYOP teams because it essentially extends the range of face-to-face communications. During loudspeaker broadcasts, the target audience becomes a captive audience that cannot escape the messages being delivered. If the message is properly tailored and has been well conceived, the target audience won't be able to escape the intended psychological impact of the message.¹²

During combat operations, loudspeakers have been shown to be more advantageous than other means of dissemination such as leaflets and radio. Unlike the different forms of

¹¹ United States. Dept. of the Army, *Psychological Operations Tactics, Techniques, and Procedures* (Washington, DC: Headquarters, Dept. of the Army, 2003), 10-12.

¹² Ibid., 10-12.

print media, loudspeakers provide tactical PSYOP teams the flexibility to rapidly adjust their messages given fast-changing battlefield situations, enabling the teams to exploit targets of opportunity. The messages can be prerecorded on audiocassette, compact disc (CD), digital recorder (MP3), or messages can be broadcasted live through the use of a microphone. Another advantage the loudspeaker provides over other forms of PSYOP media is that enemy commanders can prohibit their soldiers from picking up leaflets and listening to the radio, but they can't prohibit their soldiers from listening to loudspeaker broadcasts. Additionally, loudspeaker broadcasts do not require the target audience to take any action, to have any special equipment to receive the message, or to be literate.¹³

1. Advantages and Disadvantages of Using Loudspeakers

a. Advantages¹⁴

(1) Targets of opportunity can be exploited.

(2) Persuasive messages can be transmitted to the target as the situation changes.

(3) Loudspeakers can be an extension of face-to-face communication.

(4) The loudspeaker operator can pinpoint his target.

¹³ Stanley Sandler and U.S. Special Operations Command. Directorate of History and Museums, *Cease Resistance: It's Good for You: A History of U.S. Army Combat Psychological Operations* (Washington, D.C.? United States Army Special Operations Command. Directorate of History and Museums, 1999), 225.

¹⁴ United States. Dept. of the Army, *Psychological Operations Tactics, Techniques, and Procedures*, 10-14 - 10-15.

(5) The target audience does not have to be literate.

(6) Loudspeaker messages can be tailored to undermine the enemy's morale.

(7) Loudspeakers can be moved to operate wherever a potential target audience is located.

(8) Large, powerful, fixed loudspeakers can be used to broadcast messages considerable distances into enemy territory.

(9) Loudspeakers can be mounted on HMMWVs and watercraft.

(10) Loudspeaker operations can provide immediate feedback and impact indicators based on the actions of the target audience.

b. Disadvantages¹⁵

(1) Environmental conditions can limit the range and audibility of the loudspeaker broadcast.

(2) The enemy can easily identify loudspeaker equipment and take countermeasures, such as targeting it with direct or indirect fire.

(3) Over time, loudspeaker messages may be forgotten or mis-remembered or distorted.

2. Operational Considerations

When developing tactical loudspeaker systems, it is important to be familiar with some of the operational considerations used in planning for the use of loudspeakers in support of tactical operations.

¹⁵ United States. Dept. of the Army, *Psychological Operations Tactics, Techniques, and Procedures*, 10-15.

a. Weather

Weather conditions such as humidity, wind, and snow have a considerable effect on the range of the loudspeaker and the audibility of the broadcast by the target audience. Cold and dry air carries sound waves better and further than warm and humid air. The exception to this factor occurs when there is snow on the ground because snow absorbs and muffles sound. Rain and thunderstorms impede audibility as well. Depending on which way it is blowing, wind can be either an advantage or disadvantage to a loudspeaker broadcast. When the wind is blowing from behind the broadcast site toward the target, the audibility and range can increase several hundred meters. If broadcasting into the wind, the audibility and range will be reduced. When there is a cross wind, the wind will deflect the sound waves downwind; therefore, the loudspeaker cones must be aimed to the right or left accordingly. Winds exceeding 15 knots make long range broadcasts impractical.¹⁶

b. Terrain

Terrain can have a considerable effect on loudspeaker broadcasts. In hilly or mountainous terrain, loudspeakers should be emplaced in a position that will prevent terrain from blocking or deflecting the sound waves, creating an echo. Echoes reduce or destroy the audibility of the message. Similarly, in urban terrain the loudspeakers should be emplaced where structures will not impede the sound waves. Just as with snow, trees and brush

¹⁶ United States. Dept. of the Army, *Psychological Operations Tactics, Techniques, and Procedures*, 10-12 - 10-13.

absorb and muffle sound. Broadcasting over flat land or water is ideal as it maximizes the audibility of loudspeaker broadcasts.¹⁷

c. Equipment Limitations

In the past, FOL systems design has represented a compromise between power output, transportability, and ruggedness. In other words, the bigger the loudspeaker, the greater the output but the less transportable it is. Although PSYOP manuals state that the current vehicle FOL system can achieve a range of up to 3,200 meters under ideal conditions, the max planning range for combat operations is less than 1,400 meters. However, tactical PSYOP teams generally plan to operate at around 1,000 meters or less to ensure the message is audible to the target audience.¹⁸ In urban environments, the distance is much less.

d. Opponent Counteraction

Enemy commanders often target tactical loudspeaker teams for destruction to prevent their troops from listening to the loudspeaker broadcasts. When mounted on the HMMWV, the current loudspeaker system causes the tactical PSYOP team's vehicle to be easily recognized and targeted by the opponent due to the distinctively large speaker assembly mounted on the turret.

e. Support Operations

The success of loudspeaker operations comes down to a message that is carefully tailored to fit the given situation, and the proper positioning of the loudspeaker system to ensure the message can be heard and understood by

¹⁷ United States. Dept. of the Army, *Psychological Operations Tactics, Techniques, and Procedures*, 10-13.

¹⁸ Ibid., 10-13.

the target audience. Loudspeakers are particularly useful in tactical support of conventional operations such as exploitation, retrograde movement, static situations, and deception operations. As we are seeing in Afghanistan and Iraq, loudspeakers are proving effective in support of counterinsurgency operations as well.

f. Exploitation

The primary mission of the loudspeaker in exploitation is to persuade the opponent to surrender or cease resistance.¹⁹ Upon penetration behind enemy lines, loudspeakers can be used against enemy units that have been surrounded, isolated, or bypassed. Troops in these types of situations become ideal targets for surrender appeals or cease resistance messages because they have become isolated or separated from their adjacent units. Additionally, loudspeakers can be used to broadcast ultimatums to enemy unit commanders, ultimately causing them to capitulate.

g. Retrograde Movement

During retrograde operations, loudspeakers can be used to assist in clearing roads for military traffic, controlling and providing instruction for refugee movements, and providing non-interference messages to the civilian populace to warn against acts of sabotage.²⁰

h. Static Situations

During static situations when lines are stabilized, loudspeakers can be used against enemy combatants to undermine their morale and reduce combat efficiency by exploiting their tactical, economic, or psychological weaknesses, among others. For example, while

¹⁹ United States. Dept. of the Army, *Psychological Operations Tactics, Techniques, and Procedures*, 10-13.

²⁰ Ibid., 10-14.

peace negations were in progress during the Korean conflict, powerful loudspeakers conducted long-range missions across the Demilitarized Zone (DMZ). Loudspeaker messages can be tailored to exploit tensions that are known to exist among enemy troops. Broadcasting nostalgic themes such as music or female voices can cause enemy troops to become discontented and worried about their families at home. These types of broadcasts may not induce the enemy to surrender, but they will help to lower the enemy's morale, ultimately reducing his fighting effectiveness by encouraging dissatisfaction, malingering, and desertions.²¹

i. Deception Operations

During deception operations, loudspeakers can be used to play recordings of military vehicles such as tanks, armored personnel carriers, engineering equipment, or even helicopters. By broadcasting these sound effects, loudspeakers can be used to deceive the enemy into thinking that there are more vehicles than actually exist, ultimately causing him to surrender, retreat or deploy his forces in a manner that favors the friendly forces scheme of maneuver.

j. Consolidation Operations

During consolidation operations, loudspeakers can be used to help control and provide instruction to the civilian population of a newly occupied or liberated area.

k. Counterinsurgency Operations

During counterinsurgency operations, loudspeakers can be used to broadcast a wide variety of PSYOP messages to the civilian population and to the insurgents. Loudspeakers can be used to inform the public of the

²¹ United States. Dept. of the Army, *Psychological Operations Tactics, Techniques, and Procedures*, 10-14.

intentions of presence patrols, or of things such as curfew times, and places and times of humanitarian assistance. They can likewise broadcast names of wanted persons, or offer rewards for information.

B. HISTORICAL EVOLUTION OF LOUDSPEAKERS (WORLD WAR I - OPERATION DESERT STORM)

Loudspeakers were first put into use during combat operations by the military in World War I. Since then, PSYOP loudspeakers have been adapted to provide the capability of being mounted on various types of tactical vehicles such as light tanks, trailers, aircraft, and jeeps.

1. World War II

During World War II, loudspeakers were initially mounted on Army wheeled vehicles. However, wheeled vehicles lacked the cross-country capability required for evolving armored warfare, so loudspeakers were adapted to be mounted on "half tracks" to enable the speaker teams to keep up with the fast pace of tanks during battle. (Figure 5)



Figure 5. Loudspeakers mounted on Half Track. (From: Psywarrior)

As loudspeaker operations became more effective against the enemy, PSYOP vehicles soon became magnets for enemy direct and indirect fire. The loudspeakers were once again adapted to be mounted on light tanks, providing the speaker teams the armor protection required for the operational environment of armored battle.²² (Figure 6)



Figure 6. Loudspeaker mounted on tank. (From:
Psywarrior)

2. Korea

In the fall of 1950, the 1st Loudspeaker and Leaflet Company arrived in theater and served as the 8th Army's tactical psychological warfare unit until the end of the war in 1952. This unit relied on vehicle and aircraft mounted loudspeakers to get its verbal messages across. Loudspeakers were used to complement the leaflet campaign which was the major medium of dissemination during the conflict.²³

²² Stanley Sandler and U.S. Special Operations Command. Directorate of History and Museums, *Cease Resistance: It's Good for You: A History of U.S. Army Combat Psychological Operations* (Washington, D.C.: United States Army Special Operations Command. Directorate of History and Museums, 1999), 102.

²³ PSYOP (*Psychological Operations Warfare*): *Waging Warfare for the Mind* (Upland, Pa: Diane Publishing Co., 1995), 20.

3. Vietnam

There was little need for tank-mounted loudspeakers in Vietnam. The unconventional nature of the conflict along with technological advances to loudspeakers and microphones, making them lighter and more powerful, enabled PSYOP personnel to broadcast their message to the enemy without having to come within small arms range.²⁴ Dismounted loudspeakers were used extensively as well as boat-mounted loudspeakers along the waterways, probably one of the earliest uses of waterborne PSYOP in U.S. military history.²⁵

4. Operation JUST CAUSE (Panama)

In the Panama invasion, Operation JUST CAUSE (1990), loudspeaker teams were credited with diminishing casualties on both sides. The most famous use of loudspeakers was the broadcasting of heavy metal music in front of the Papal Nunciature; this broadcasting was reportedly conducted to convince Noriega and his cronies to turn themselves over to U.S. forces. However, the fact is the harassing broadcasts were intended to mask from the media the very delicate negotiations being conducted between Noriega and U.S. representatives.²⁶

5. Operation DESERT STORM (Iraq)

Loudspeaker operations served to reinforce radio broadcasts and the leaflet campaign during Operation DESERT STORM that ultimately contributed to the surrender of over

²⁴ Sandler and U.S. Special Operations Command. Directorate of History and Museums, *Cease Resistance: It's Good for You: A History of U.S. Army Combat Psychological Operations*, 304.

²⁵ Ibid., 271.

²⁶ Dennis W. Bartow, "Combat Loudspeakers: Weapon of the Battlefield Evangelists," *Psywarrior*; available from <http://www.psywarrior.com/combatloudspeakers.html>; Internet; accessed 19 November 2006.

70,000 Iraqis. Feedback from enemy prisoners was positive, indicating that, "...loudspeaker teams told us where [to surrender after the] leaflets and radio showed us how."²⁷ Despite this success, the Post Operational Analysis noted that, in some cases, the unarmored wheeled vehicles used by PSYOP forces prevented them from accompanying supported armored or mechanized units.²⁸

C. WHY LOUDSPEAKERS REMAIN A VITAL DISSEMINATION ASSET - OPERATION IRAQI FREEDOM (OIF)/ OPERATION ENDURING FREEDOM IN AFGHANISTAN (OEF)

Operation ENDURING FREEDOM (OEF) in Afghanistan and Operation IRAQI FREEDOM (OIF) provided the first true test in combat operations of the current configuration of the vehicle loudspeaker system. Tactical PSYOP teams have been easily identified on the battlefields of Afghanistan and Iraq by the large box shaped loudspeaker assembly mounted to the turret ring on top of their High Mobility Multipurpose Wheeled Vehicles (HMMWV). Although the loudspeakers continue to prove their effectiveness against the enemy during combat, problems with the loudspeaker system and recommended improvements are being identified by tactical PSYOP units.

Similar to the problem encountered by PSYOP units during WW II, PSYOP teams during OIF and OEF faced the dilemma of not having the ability to adapt their loudspeaker system to the type of vehicle best suited to support the type of unit to which they were attached. For instance, the TPTs that were attached to armor and mechanized units of the 3rd Infantry Division during the initial combat operations of OIF had to figure out how to

²⁷ James L. Selders, *Psychological Operations during Desert Shield* (Macdill Air Force Base, FL: Col. Bryan N. Karabaich, 1993), 4-10.

²⁸ Ibid., 5-11.

mount the loudspeaker system, which originally was designed to be mounted on a modified turret ring of a HMMWV, to an M113 armored personnel carriers (APC). (Figure 7) These armored vehicles provided the TPTs the cross-country speed and armor protection necessary while operating with an armored unit. Thanks to the ingenuity of the soldiers and multiple ratchet straps, the TPT was able to mount the loudspeaker system on the M113. However, this modification of the loudspeaker system was the exception rather than the norm. Most TPTs crossed the border into Iraq in unarmored M1025 HMMWVs, even though attached to armored and mechanized units. The TPTs exposed themselves to increased risk due to the inferior survivability of their HMMWVs.



Figure 7. M113 APC with Vehicle Loudspeaker. (From: Psywarrior)

The PSYOP teams attached to Special Forces units faced a similar vehicle problem. They were originally supposed to accompany operational detachments into Iraq in non-tactical, civilian-type pickup trucks. However, there was no way to mount the speaker system to the vehicle without designing a special mount for the beds of the trucks and

converting the electrical system to power the loudspeakers. In Afghanistan, Special Forces were also using non-tactical vehicles in order to blend in with the local populace. PSYOP teams supporting them were forced to improvise with man pack loudspeaker systems to broadcast from civilian vehicles. Clearly, given these new demands, a design that enables the loudspeaker system to be mounted on various types of both tactical and non-tactical vehicles would provide TPTs the flexibility to adapt to both conventional and unconventional combat operations.

The current loudspeaker system is a unidirectional system that was designed to support a conventional, Cold War style fight. The majority of the operations TPTs have been deployed to support have required both a unidirectional and multidirectional capability. In the conventional operational environment of the first three months of OIF, most of the loudspeaker broadcasts were capitulation messages intended for Iraqi military forces and the directional capability of the loudspeaker system was sufficient. As the operational environment transitioned from being conventional to more unconventional in nature, loudspeaker operations typically consisted of informational type broadcasts within urban environments where a multidirectional loudspeaker would have greatly enhanced the effectiveness of the broadcasts. However, there were still operations that required the unidirectional capability that could focus the broadcasts on a specific target audience. In March of 2004, during the siege of Fallujah, Iraq, multiple TPTs surrounding the city utilized the directional capability to broadcast rock music into the city to interrupt the sleep patterns of the

insurgents. One TPT used its loudspeaker to broadcast armored vehicle sounds to draw insurgents into an ambush; in this instance, the insurgents themselves were setting up an ambush to destroy the "tanks" with rocket propelled grenades. (Figure 8) A loudspeaker with the flexibility to broadcast in both directional and multidirectional modes would greatly enhance the capability of the loudspeaker teams for both types of combat - conventional and unconventional - and would allow teams already in place to take advantage of changes as they occur on the ground.

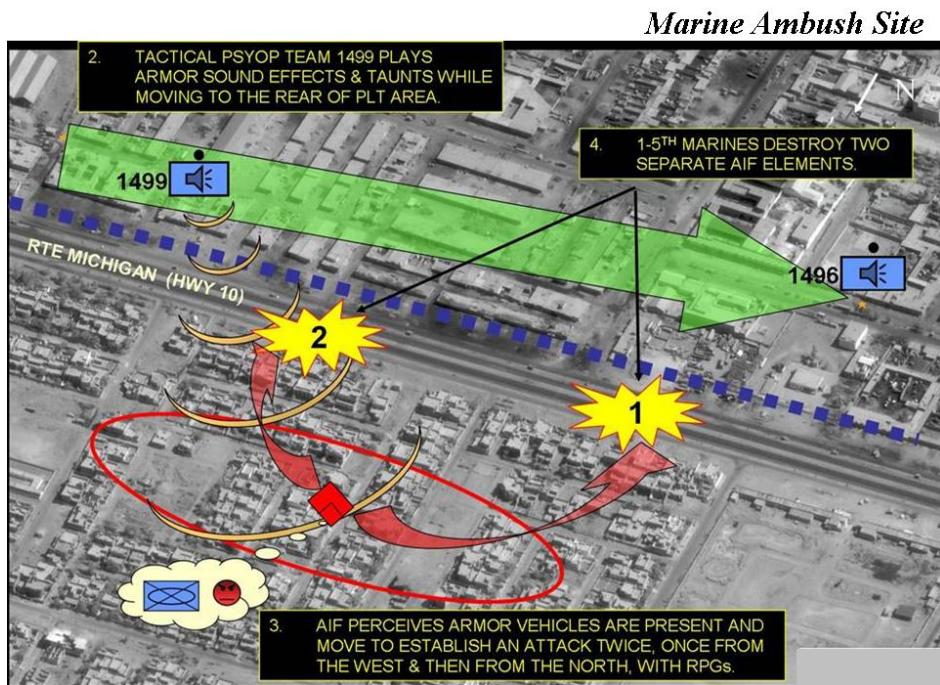


Figure 8. Graphic depicting PSYOP deception operation in support of Marines in Fallujah. (From: Tony Paz)

D. DEFINING THE NEW OPERATIONAL ENVIRONMENT

Operations in Iraq no longer reflect a conventional battle space. Soon after declaring the end of major combat operations in May 2003, it became clearly evident that combat was not over but had simply transitioned to something different. According to some experts, the

situation in Iraq can best be described as fourth-generation warfare (4GW). 4GW is an evolved form of insurgency. "4GW uses all available networks - political, economic, social, and military - to convince the enemy's political decision makers that their strategic goals are either unachievable or too costly for the perceived benefit."²⁹ Through recent military operations, the U.S. has proven its dominance in conventional warfare, also known as 3rd Generation Warfare (3GW). Therefore, our adversaries have turned to indirect means to do battle with us. We see examples of this type of warfare today in Iraq and Afghanistan. The environment is urban and operations are launched both by and against an adversary that blends in with the local populace and attacks unexpectedly from a multitude of directions.

²⁹ Thomas Hammes, *The Sling and the Stone: On War in the 21st Century* (Grand Rapids, MI: Zenith, 2004), 2.

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IV. CURRENT LOUDSPEAKER SYSTEMS

A. CURRENT FAMILY OF LOUDSPEAKER SYSTEMS

The current vehicle mounted loudspeaker system in use by tactical PSYOP teams is the Vehicle/Watercraft Tactical Loudspeaker. The vehicle loudspeaker system (VLS) is one of four different loudspeakers that make up the family of loudspeakers (FOL) in use by PSYOP forces today. The other three loudspeakers are the manpack tactical loudspeaker system (MPLS); the rotary wing aerial tactical loudspeaker system (ALS); and an alternate configuration of the vehicle loudspeaker system, called the watercraft loudspeaker system (WCLS).

1. Manpack Tactical Loudspeaker System

The MPLS (Figure 9) is battery operated, man-portable, rugged, and easy to use. It can be operated with the speaker array assembly in the field pack (rucksack), adjacent to the field pack, or remoted up to 50 feet from the field pack. The primary components of the MPLS include the speaker array assembly (consisting of two speaker cones), the amplifier/battery box, the control module assembly, the recorder/reproducer, cables, and the field pack. Under ideal environmental conditions, the maximum effective range of the MPLS is only 1,000 meters.³⁰ Although the complete system weighs in excess of 35 pounds,

³⁰ United States Army John F. Kennedy Special Warfare Center and School, *Psychological Operations Handbook: Equipment Types, Specifications, and Capabilities* (Fort Bragg, NC: Headquarters, United States Army John F. Kennedy Special Warfare Center and School, 2005), 33.

the MPLS is designed to be carried by a member of the tactical PSYOP team during dismounted operations.³¹



Figure 9. Manpack Loudspeaker System (From: PSYOP Handbook)

2. Rotary Wing Aerial Tactical Loudspeaker System

The ALS (Figure 10) is transportable, rugged, easy to use, and relatively easily transferable from platform to platform given previously installed mounting hardware. The ALS is normally operated with the aircraft in flight or while on the ground, but the broadcast coverage is a function of aircraft height while broadcasting.³² The ALS was primarily designed to be mounted on the UH-60 Blackhawk helicopter; therefore, its use tends to be limited by the availability of those aircraft. Another downside to the ALS is that aircraft engine and rotor noise impedes the audibility of the broadcast.

³¹ United States Special Operations Command, *Operator, Unit and Direct Support Maintenance Manual with Repair Parts and Special Tools List for the Loudspeaker, Tactical, Manpack* (MacDill AFB, FL: Headquarters, Special Operations Command, 1999), 1-5.

³² Ibid.



Figure 10. ALS mounted on UH-60 Blackhawk (From: PSYOP Handbook)

3. Vehicle/Watercraft Tactical Loudspeaker System

The vehicle/watercraft loudspeaker system (VLS) is designed to be operated while mounted on tactical wheeled vehicles (Figure 11) and tactical watercraft (Figure 12) that can provide the loudspeaker system 24 volts of direct current (Vdc) power.³³ The loudspeaker can also be remoted up to 50 feet from the vehicle/watercraft using the system's interconnecting cables and by mounting the speakers on an optional collapsible/adjustable speaker stand. The primary components of the VLS are a standard high frequency (HF) speaker array assembly, an optional low frequency (LF) speaker module, a loudspeaker interface, an amplifier array assembly, a control module assembly, and a recorder/reproducer.

³³ United States Special Operations Command, *Operator, Unit, and Direct Support Maintenance Manual with Repair Parts and Special Tools List for the Loudspeaker, Tactical, Vehicle/Watercraft* (MacDill AFB, FL: Headquarters, Special Operations Command, 2001), 1-5.



Figure 11. VLS mounted on M1025 HMMWV (From:
Psywarrior)



Figure 12. VLS mounted on tactical watercraft (From:
PSYOP Handbook)

a. High Frequency Speaker Array Assembly

The high frequency (HF) speaker array is comprised of six loudspeakers and three junction boxes mounted to the speaker array frame in a three by two configuration. The HF speaker array assembly weighs 76 pounds and is 19.53 inches high, 33.78 inches wide, and

15.6 inches deep.³⁴ The HF speaker array broadcasts audio in the 650 to 3500 hertz (Hz) range.³⁵ When the optional low frequency (LF) module is used, the HF speaker array mounts to the top of the LF module.

b. Low Frequency Speaker Module

The optional low frequency (LF) speaker module is used with the HF speaker array assembly and extends the audio frequency of the VLS from 650 Hz down to 400 Hz.³⁶ The LF speaker module notably increases the quality of bass which is especially useful when broadcasting sound effects in support of deception operations. However, the LF speaker is quite heavy and increases the overall size of the loudspeaker assembly. The LF speaker module weighs 123 pounds and is 15.01 inches high, 30.51 inches wide, and 26.45 inches in depth.³⁷ When the LF speaker module is used, it is mounted to the loudspeaker interface, and the HF speaker assembly is mounted on top of the LF speaker module. (Figure 13)



Figure 13. LF and HF loudspeakers mounted on HMMWV.
(From: Psywarrior)

³⁴ United States Special Operations Command, *Operator, Unit, and Direct Support Maintenance Manual with Repair Parts and Special Tools List for the Loudspeaker, Tactical, Vehicle/Watercraft* (MacDill AFB, FL: Headquarters, Special Operations Command, 2001), 1-12 - 1-13.

³⁵ Ibid., 1-5.

³⁶ Ibid.

³⁷ Ibid., 1-12 - 1-13.

c. Loudspeaker Interface

There are two types of loudspeaker interfaces, the watercraft loudspeaker interface, and the vehicle loudspeaker interface. The watercraft loudspeaker interface provides mounting capability of the HF array support tray to the Mark V tactical watercraft. It weighs 98 pounds and is 24 inches high, 38 inches wide and 18 inches deep.³⁸ The watercraft loudspeaker interface includes watercraft tie down straps to secure it to the deck of the Mark V. The vehicle loudspeaker interface provides mounting capability between the HF array support tray and the M1025 HMMWV turret mount. It weighs 60 pounds and is 15 inches high, 31.5 inches wide and 22 inches deep.³⁹

d. Amplifier Array Assembly

The amplifier array assembly consists of an amplifier assembly, an array mounting frame assembly, and an amplifier guard assembly. The amplifier assembly contains six audio amplifier modules, a dc power supply module, and associated components. The audio amplifier modules amplify the selected audio from the control module to drive the speakers. The power supply module converts 24 Vdc vehicle or watercraft input to meet the VLS power requirements.⁴⁰ The array mounting frame assembly enables the amplifier assembly to be mounted in the vehicle or watercraft. The amplifier guard assembly provides protection to the amplifier array assembly for both vehicle

³⁸ United States Special Operations Command, *Operator, Unit, and Direct Support Maintenance Manual with Repair Parts and Special Tools List for the Loudspeaker, Tactical, Vehicle/Watercraft* (MacDill AFB, FL: Headquarters, Special Operations Command, 2001), 1-12 - 1-13.

³⁹ Ibid.

⁴⁰ Ibid., 1-6.

and watercraft configurations. The complete amplifier array assembly in the vehicle configuration weighs 70 pounds and is 19 inches high, 33 inches wide, and 14.5 inches deep.⁴¹

e. Control Module Assembly

The control module assembly is attached to the amplifier array assembly via a six or 25 foot control cable and provides connectors for low level audio inputs such as cassette recorders, minidisk recorders, and digital audio recorders (MP3 players). It also provides controls for selecting the audio source and for adjusting output volume. The control module assembly also contains a digital voice recorder (DVR) that has the capability to record, select, and play back up to 3-minute audio messages.⁴²

f. Recorder/Reproducer

The recorder/reproducer (R/R) includes an environmental case, cassette recorder, minidisk recorder, headset, wireless microphone, and a set of interface cables. The case also provides protective storage for other components, such as an MP3 player. The R/R contains internal cabling that connects the wireless receiver, cassette recorder, minidisk, etc. to cable connectors on the R/R case exterior.⁴³

⁴¹ United States Special Operations Command, *Operator, Unit, and Direct Support Maintenance Manual with Repair Parts and Special Tools List for the Loudspeaker, Tactical, Vehicle/Watercraft* (MacDill AFB, FL: Headquarters, Special Operations Command, 2001), 1-12 - 1-13.

⁴² Ibid., 1-6.

⁴³ Ibid.

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V. CONCLUSION

A. SHORTFALLS OF THE CURRENT VLS WITH RECOMMENDATIONS FOR THE NEXT GENERATION VLS

Many shortfalls in the current vehicle loudspeaker system have been identified thanks to feedback provided from tactical PSYOP units who have employed the LS system during Operations ENDURING FREEDOM and IRAQI FREEDOM.

1. Speaker Array Assembly Weight and Size

When mounted to the M1114 HMMWV turret ring, the weight of the HF speaker array assembly in combination with the weight of the vehicle loudspeaker interface and gunner's shield assembly hinders the turret gunner's ability to operate the turret, putting him and the team at risk.

The total weight of the HF speaker array assembly and vehicle loudspeaker interface is 136 pounds. When the LF speaker module is used, the total weight nearly doubles to 259 pounds. In combination with the extreme weight of the gunner's shield assembly, the turret is difficult to spin, especially if the HMMWV is not on level terrain. When the HMMWV is parked on a slope and the turret lock is disengaged, gravity causes the turret to naturally spin so the speaker assembly is on the downhill side of the HMMWV. This forces the operator to use both hands and most of his body weight to fight the effects of gravity and physically manipulate the turret into position in order to point the speakers in the direction of the target audience or point his turret-mounted weapon in the direction of the enemy.

While physically manipulating the turret, the soldier is unable to man his weapon and provide security which puts him and his fellow soldiers at risk.

Furthermore, the weight of the loudspeaker assembly and the weight of the gunner's shield assembly are not evenly distributed on the turret ring. When the turret gunner points the turret-mounted weapon towards the front of the HMMWV, the speaker faces towards the right side of the HMMWV. Essentially, the weight of the gunner's shield and loudspeaker assembly is concentrated on one quarter ($\frac{1}{4}$) of the turret ring. As a result of the unequal distribution of weight, the turret has a tendency to sometimes bind, preventing the gunner from being able to spin the turret at all. In addition, the heavy weight of the speaker cone assembly puts its operator at risk while conducting vehicular movements. While traveling the roads and highways in Iraq, vehicle convoys travel at relatively high rates of speed to minimize the ability of the enemy to accurately target vehicles with roadside improvised explosive devices (IEDs). When the driver of the vehicle applies the brakes, either to slow down or come to a sudden stop, the forward momentum causes the turret to quickly spin so that the speaker assembly faces the front of the vehicle. Correspondingly, the opposite effect is also true. When the driver quickly accelerates, the turret spins so that the speaker assembly is facing the rear of the vehicle. To prevent this inadvertent turret rotation from occurring, the turret lock must be engaged. However, if the turret lock is engaged, the soldier is unable to

quickly manipulate the turret to keep his weapon pointed in the proper position to quickly return fire if attacked by the enemy.

When mounted on the M1114 HMMWV, the height of the HF speaker array assembly stands nearly 3 feet (34.53 inches) above the top of the vehicle. When the LF module is used, the loudspeaker stands a little over 4 feet (49.54 inches) above the top of the vehicle. The height of the current VLS is creating an easily identifiable signature of the tactical PSYOP team vehicles, decreasing the survivability of the team.

The bulky size of the current speaker array assembly limits the operator's field of vision. (Figure 14) The speaker assembly is designed to be mounted on the turret to the right of the gunner's shield and weapon system that are also mounted on the turret. Therefore, the speaker assembly obstructs the soldier's field of vision to his right making him vulnerable to attack from that direction. The turret gunner must constantly manipulate the turret to ensure that he is able to see to his right. As previously described, the heavy weight of the speaker assembly does not make the manipulation of the turret an easy task. From the authors' personal experience in Iraq, this is especially true in urban environments where the potential direction of enemy combatants is unknown, thereby mandating that the turret gunner maintain a 360 degree field of vision.

The next generation of VLS (NGVLS) must be lighter and mounted somewhere other than on the turret ring along with the gunner's shield. This will improve the turret gunner's ability to spin the turret quickly and more efficiently

while providing security for his team. Also, a lighter and better balanced turret ring will enable the turret gunner to maintain control of the turret during rapid acceleration and deceleration of the HMMWV. Additionally, the NGVLS must have a low profile and non-protrusive visual signature. A low profile loudspeaker system will decrease the signature of the PSYOP team vehicle, increasing the team's survivability by preventing it from being easily identified on the battlefield. A low profile system will also improve the turret gunner's field of vision, further increasing the tactical PSYOP team's survivability. Although a lighter and smaller speaker array is highly desired, range, sound quality and volume cannot be sacrificed.



Figure 14. M1114 HMMWV with VLS and gunner's shield.
(From: USASOC News Service)

2. Mounting Incompatibilities

According to the vehicle loudspeaker's technical manual, the loudspeaker was designed to be mounted on the

M1025 HMMWV. Just prior to OIF, the tactical PSYOP force was fielded with the M1114 armored HMMWV and modifications to the turret ring were made to enable the VLS to be mounted to it. The need for modifications to the M1114 created problems when PSYOP vehicles were destroyed and the loudspeakers needed to be transferred to M1114 HMMWVs that did not possess the modification. Additionally, as described in Chapter 3, operations during OIF required that the loudspeaker be mounted on other types of vehicles (M113 Armored Personnel Carriers and non-tactical vehicles) for which it was not designed.

Since the beginning of OIF, the HMMWV armor has evolved to improve the survivability of its occupants. One major improvement was the addition of ballistic protection kits around the turret to protect the gunner. When installed, the ballistic protection kit prevents the vehicle loudspeaker interface from being mounted as designed.

Clearly, the NGVLS system should not be designed to only fit a specific vehicle or class of vehicles. Because the VLS is often used to support Special Operations Forces whose mission requirements dictate the types of vehicles, the system should be able to be mounted on both tactical and non-tactical vehicles. The NGVLS should not be designed to be mounted on the gunner's turret or require any special modifications to the vehicle. Additionally, it should not interfere with the turret-mounted weapon systems or ballistic protection kits when mounted on a M1025 or M1114 HMMWV.

3. Unidirectional Broadcast Limitation

The current vehicle loudspeaker system was designed to provide a unidirectional broadcast capability that was required for the conventional (3GW) battlefield. Based on the current operational environment (4GW), there is a need for a multidirectional system.

In Iraq, most of the operations for which tactical PSYOP teams need loudspeakers are occurring within built-up, urban areas. Within this environment, the current unidirectional system is overpowering and limits the broadcast area to one street at a time. A multidirectional system would provide the team a wider area of coverage without overpowering the target audience. Additionally, a multidirectional capability would improve deception operations by providing a more realistic, three dimensional sound. For example, when broadcasting tracked vehicle sound effects, the current system requires that the enemy location be known so that the loudspeaker can be pointed in that direction. The enemy location would not need to be known when broadcasting the sound effects with a multidirectional system. However, this is not to suggest the absence of a need for unidirectional capability as well. As demonstrated in both Iraq and Afghanistan, tactical PSYOP teams are still conducting loudspeaker broadcasts into denied areas that require a unidirectional capability. The NGVLS system should be designed to provide both a unidirectional and multidirectional capability. This can be achieved by positioning loudspeakers on all four sides of the vehicle with the capability to turn each side on or off as is needed.

4. Modularity/Maintenance

The current VLS system is not modular. Although the HF speaker array assembly contains six speaker cones, it is one component of the end item. In other words, if one speaker cone is damaged, the entire speaker array assembly must be sent to direct support maintenance to be repaired. During combat operations or during missions where direct support maintenance is not readily available, if the current system breaks, the team's ability to conduct loudspeaker operations is diminished. A modular system would enable the tactical PSYOP teams to deploy with additional repair parts that can be installed at the user level.

The NGVLS system should incorporate modular technology that permits interchangeability of major components (amplifiers, speakers, control devices, etc.) between the entire family of loudspeakers (vehicle, manpack, and aerial). In other words, the PSYOP team should be able to use the loudspeaker from its manpack system to replace a broken speaker on its vehicle loudspeaker system. Additionally, commercial, off-the-shelf type components should be incorporated so that parts can easily be replaced.⁴⁴ Modularity would also enable much of the maintenance to be conducted at the user level. Every PSYOP team could then deploy with spares of the components that most often break, such as speaker cones, cables, and control modules.

⁴⁴ United States Army Special Operations Command, *Capability Development Document for Next Generation Loudspeaker System* (Fort Bragg, NC: Headquarters, United States Army Special Operations Command, [2005]), 7.

5. Power Supply

The current VLS power distribution box on the amplifier array assembly operates on the standard military vehicle 24 volt system. However, standard civilian vehicles operate on a 12 volt system which creates a problem when the VLS needs to operate from a civilian, non-tactical vehicle.

The NGVLS power supply unit must incorporate power inverter and battery technology via a power distribution box that will allow connection to 12v and 24v civilian and military vehicle electrical systems. The power distribution box must be designed to be capable of connecting directly to the vehicle battery, an auxiliary power outlet, military connector (tactical radio power supply), or directly from an internal battery set.⁴⁵ Additionally, the power distribution box should possess both 110v and 220v outlets to provide power for auxiliary items, rechargeable batteries, manpack loudspeaker systems, etc.⁴⁶

6. Interconnectivity

The current loudspeaker system does not offer the capability of interconnecting loudspeaker systems. Nor does it provide the capability to electronically send and receive digitally recorded messages. During operations in Fallujah, for example, the tactical PSYOP detachment assigned to that city positioned its loudspeaker teams around the city. Because their loudspeaker systems were not interconnected, they were unable to simultaneously

⁴⁵ United States Army Special Operations Command, *Capability Development Document for Next Generation Loudspeaker System* (Fort Bragg, NC: Headquarters, United States Army Special Operations Command, [2005]), 8.

⁴⁶ Ibid.

broadcast their messages, which limited the overall effectiveness of the broadcast. Additionally, because of the distance between the loudspeaker teams, the detachment commander was unable to quickly disseminate new messages to his teams as the tactical situation changed, further limiting the effectiveness of the broadcasts.

The NGVLS must be designed with the capability to wirelessly interlink multiple loudspeaker systems and centrally control them with one device. Additionally, the NGVLS must possess the capability to send and receive digitally recorded messages or sound effects.

B. CONCLUSION

While in support of either Special Operations Forces or conventional forces in friendly, hostile, deep, or denied territory across the full spectrum of conflict, PSYOP forces have a need for the capability to reach and influence target audiences with high quality audio dissemination and acoustic reproduction.⁴⁷ By providing our tactical PSYOP forces with a loudspeaker system that meets the aforementioned requirements,

- Lighter, less obtrusive speaker array assembly
- Mounting flexibility
- Unidirectional broadcast capability
- Modularity
- Power supply flexibility
- Interconnectivity with other LS systems

⁴⁷ United States Army Special Operations Command, *Capability Development Document for Next Generation Loudspeaker System* (Fort Bragg, NC: Headquarters, United States Army Special Operations Command, [2005]), 2.

they will be a much more efficient combat multiplier, capable of providing their supported commanders with a more effective means of reaching their target audiences.

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